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10/773,311

02/09/2004

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EXAMINER

DIAZ, JOSE R

ART UNIT

PAPER NUMBER

2815

MAIL DATE

DELIVERY MODE

07/25/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|--|--|
| Office Action Summary | Application No. 10/773,311 | Applicant(s) KAWABATA ET AL. | |
| | Examiner JOSE R. DIAZ | Art Unit 2815 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 April 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) 6-36 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art in view of Hoppe et al. (US 2002/0167375 A1).

Regarding claims 1, 4 and 5, Applicant's admitted prior art discloses a semiconductor device comprising:

- a first wiring copper layer (13) [Fig. 1],
 - an interlayer insulating film (17) over the first wiring copper layer [Fig. 1],
 - a second wiring copper layer (15/21) formed on the interlayer insulating film [Fig. 1], and
 - a wiring via (via hole) formed in the interlayer insulating film (17) to electrically connect the first wiring copper layer (13) to the second wiring copper layer (15/21) [Fig. 1 and paragraph 0007],
- wherein the wiring via (via hole) comprising a carbon element cylindrical structure body (11) [Fig. 1].

Applicant's admitted prior art essentially discloses the claimed invention except a layer of alloy of a catalyst metal and a second metal different from the catalyst metal, the layer being formed on the first wiring copper layer, a layer of carbide of the second

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metal formed on the layer of alloy, and a carbon element cylindrical structure body incorporating therein the catalyst metal, the body being formed on the layer of carbide.

Hoppe teaches a layer of (Ti/Ni) alloy of a catalyst metal (Ni) and a second metal (Ti) different from the catalyst metal [paragraph 0051], the layer being formed on the first wiring layer (20) [Fig. 1], a layer of carbide of the second metal formed on the layer of alloy [please note that titanium carbide is formed simultaneously with the growth of carbon nanotubes from the catalyzing Ti/Ni alloy], and a carbon element cylindrical structure body (18) incorporating therein the catalyst metal [paragraph 0051], the body (18) being formed on the layer of carbide [please note that the layer of carbide is formed simultaneously with the growth of carbon nanotubes from the catalyzing Ti/Ni alloy].

Regarding claim 2, Hoppe teaches wherein the catalyst metal is Ni or Co [paragraph 0051].

Regarding claim 3, Hoppe teaches that the second metal is Ti [paragraph 0051].

Hoppe and Applicant's admitted prior art are analogous art because they are from the same field of endeavor as applicant's invention. At the time of the invention it would have been obvious to a person of ordinary skill in the art to include a layer of alloy of a catalyst metal and a second metal different from the catalyst metal, the layer being formed on the first wiring copper layer, a layer of carbide of the second metal formed on the layer of alloy, and a carbon element cylindrical structure body incorporating therein the catalyst metal, the body being formed on the layer of carbide. The motivation for doing so, as is taught by Hoppe, is enhancing the geometry of the nanotube arrays

(paragraph 0051). Therefore, it would have been obvious to combine Applicant's admitted prior art with Hoppe to obtain the invention of claims 1-5.

Response to Arguments

9. Applicant's arguments with respect to claims 1-5 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOSE R. DIAZ whose telephone number is (571)272-1727. The examiner can normally be reached on Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Parker can be reached on (571) 272-2298. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kenneth A Parker/
Supervisory Patent Examiner, Art Unit 2815

/J. R. D./
Examiner, Art Unit 2815